

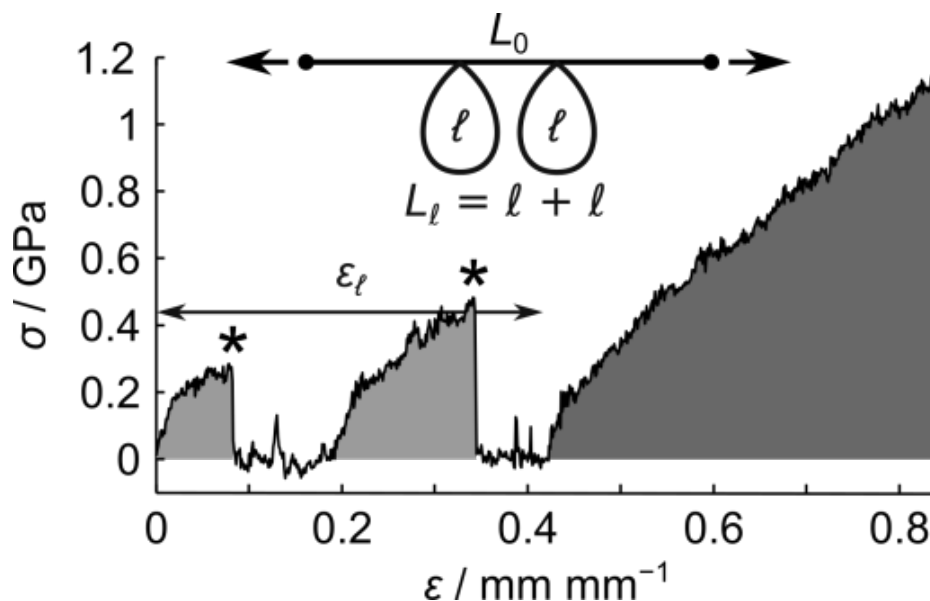
WM-1603: FIBER WITH SACRIFICIAL JUNCTIONS

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Application: Toughness Enhancement of Fibers, Nets

Technology Background: Fibers of enhanced toughness have long been sought by mankind for many different applications. One example is Kevlar®, which is widely used in bullet-proof apparel and has very high toughness. Another example is spider silk, which is a semicrystalline biopolymer with superb mechanical properties. We determined that the recluse spider produces a biological metamaterial: its ribbon-like silk is woven into serial micro-loops by an intricate spinneret motion. This looped architecture enhances its capacity to absorb energy, making it an ideal candidate for biomimicry in future synthetic metamaterials.

We have developed high-strength fibers using a continuous fiber having loops welded (e.g., with a UV-light curing adhesive) with sacrificial junctions. The fiber compositions have a toughness that is at least tenfold greater than the toughness of otherwise equivalent compositions of the fiber material that lack any such loops.



Intellectual Property: Pending U.S. Patent Application

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